Daniil Svyatskiy

Mathematical Modeling and Analysis
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Education

- **University of Houston**,
  Houston, TX.
  Ph. D., Applied Mathematics (May 2006).
  Thesis title: *Discretization methods and iterative solvers for diffusion equation on unstructured polyhedral meshes.*
  GPA 3.88/4.00
- **University of Houston**,
  Houston, TX.
  Master of Science, Applied Mathematics (December 2004).
  GPA 3.88/4.00
- **Moscow Institute of Physics and Technology (Technical University)**,
  Moscow, Russia.
  Master of Science, Applied Mathematics and Physics (June 2000).
  Thesis title: *Matrix condensation and multigrid methods.*
  GPA 4.91/5.00
- **Moscow Institute of Physics and Technology (Technical University)**,
  Moscow, Russia.
  Bachelor of Science, Applied Mathematics and Physics (June 1998).
  GPA 4.9/5.00

Work experience

- Postdoctoral Research Associate , T-7, LANL, Los Alamos, NM (2006 - present).
- Graduate Research Assistant , T-7, LANL, Los Alamos, NM (2005).
- Graduate Research Assistant , T-7, LANL, Los Alamos, NM (2004).
- Research Assistant, Department of Mathematics, University of Houston, Houston, TX (2003 - 2006). *Research is supported by ExxonMobil Upstream Research Co.*
- Research Associate, Institute of Numerical Mathematics, Russian Academy of Sciences, Moscow, Russia (1999 - 2003).
- Programmer, Russian Research Centre Kurchatov Institute, Institute of High Technologies and Experimental Machine Building (IHTEMB), Moscow, Russia (1998 - 2003).

Research interests

- ◇ Discretization techniques for partial differential equations: Finite element methods, Mimetic finite difference methods, Finite Volume methods. Development of new discretization methods that satisfy discrete maximum principle.
- ◇ Multiphase flow simulations. Multiscale methods.
- ◇ Multilevel/Multigrid solvers and preconditioning of Krylov iterative methods.
- ◇ Mesh generation.

Awards

- ◇ Kurchatov prize for outstanding young scientists and engineers, 2001.

Publications

- ◇ Lipnikov K., Moulton D., Svyatskiy D. *A Multilevel Multiscale Mimetic (M^3) Method for Two-Phase Flows in Porous Media*, Journal of Computational Physics 227(2008), 6727–6753.
- ◇ Lipnikov K., Shashkov M., Svyatskiy D., Y. Vassilevski, *Monotone finite volume schemes for diffusion equations on unstructured triangular and shape-regular polygonal meshes*, Journal of Computational Physics 227 (2007), 492–512
- ◇ Boiarkine O., Kuznetsov Y., Svyatskiy D., *Diffusion equation on nonmatching hexahedral meshes.* Russian Journal of Numerical Analysis and Mathematical Modeling, 2007, Vol. 22(4), 1–14.
- ◇ Lipnikov K., Shashkov M., Svyatskiy D. *The mimetic finite difference discretization of diffusion problem on unstructured polyhedral meshes.* Journal of Computational Physics 211 (2006) 473–491.
- ◇ Chugunov V., Svyatski D., Tyrtyshnikov E, Vassilevski Y. *Parallel iterative multilevel solution of mixed finite element systems for scalar equations* Concurrency and Computation Practice & Experience; 25 April 2006; vol.18, no.5, p.501-518.
- ◇ Achdou Y.,Jaffr'e J., Svyatskiy D., Vassilevski Y. *Numerical simulation of unsteady 3D flows on anisotropic grids.* Transactions of French-Russian Liapounov Institute for Applied Mathematics and Computer Science. V.4, MSU, Moscow, (2003) p.107-124
- ◇ Chugunov V., Goreinov S., Savostyanov D., Svyatskiy D., Tyrtyshnikov E. *Mathematical software for solving problems on multiprocessor computational clusters (Russian).* Technical Report 02.200.203461, Institute of Numerical Mathematics, RS, Moscow, (2002)
- ◇ Svyatskiy D. *Matrix structure in cyclic reduction method (Russian).* In "Numerical analysis and mathematical modeling", INM, Moscow (1999) 160–173

Talks

- ◇ Lipnikov K. , D. Moulton, Svyatskiy D., *A Multilevel Multiscale Mimetic (M^3) Method for Two-Phase Flows in Porous Media* The XVII International Conference on Computational Methods in Water Resources (CMWR 2008), San Francisco, CA, 2008.
- ◇ Lipnikov K. , D. Moulton, Svyatskiy D., *A Multilevel Multiscale Mimetic (M^3) Method for Two-Phase Flows in Porous Media* AGU Fall Meeting, San Francisco, CA, 2007.

- Svyatskiy D., *Nonlinear monotone finite volume method for diffusion equation,* CSE Seminar, University of Illinois at Urbana-Champaign, IL, 2007
- Kuznetsov Y., Svyatskiy D., *New multilevel preconditioner for diffusion-type problems on polyhedral meshes.* Eighth IMACS International Symposium on Iterative Methods in Scientific Computation, College Station, TX, 2006.
- Kuznetsov Y., Svyatskiy D., *New multilevel preconditioner for diffusion-type problems on polyhedral meshes.* French Petroleum Institute, Paris, 2006.
- Svyatskiy D., Kuznetsov Y. *New multilevel preconditioner for diffusion-type problems on polyhedral meshes.* LACSI Symposium 2005. Santa Fe, NM, 2005
- Svyatskiy D., Kuznetsov Y., Lipnikov K., Shashkov M. *Mimetic finite difference discretization of diffusion-type problems on unstructured polyhedral meshes.* Finite Element Rodeo 2005. Dallas, TX, 2005.
- Svyatskiy D., Kuznetsov Y., Lipnikov K., Shashkov M. *Mimetic finite difference discretization of diffusion-type problems on unstructured polyhedral meshes.* LACSI Symposium 2004. Santa Fe, NM, 2004.

Technical Skills

- **Numerical Analysis:** I have 9 years of experience in developing algorithms for the numerical solution partial differential equations. Knowledge of discretization techniques includes finite differences, finite elements, finite volume methods, etc. Knowledge of iterative solution techniques includes preconditioned Krylov subspace, multigrid and domain decomposition methods.
- **Programming:** Experience with many languages, including Fortran 77/9x, C/C++, MPI, Python, Matlab, Maple, TechPlot, Data Explorer, LATEX, PostScript, HTML. Currently working on multi-developer project using the version control system (SVN).

Training

- Completed the course on *Nonlinear Finite Element Analisys* taught by Ted Belytschko and Thomas J. R. Hughes, Austin, TX, 2007

References

- **Dr. Konstantin Lipnikov** T-7, Los Alamos National Laboratory,
  MS B284, Los Alamos, NM 87544
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- **Dr. David J. Moulton** T-7, Los Alamos National Laboratory,
  MS B284, Los Alamos, NM 87544
  Phone: (505) 665 4712 Fax: (505) 665 5757 E-mail: moulton@lanl.gov

- **Dr. Yuri Kuznetsov**
  University of Houston, Department of Mathematics, 651 PGH
  Houston, TX 77204
  Phone: (713) 743-3493, Fax: (713) 743-3505, E-mail: kuz@math.uh.edu

- **Dr. Roland Glowinski**
  University of Houston, Department of Mathematics, 651 PGH
  Houston, TX 77204

Phone: (713)-743-3473, Fax: (713) 743-3505, E-mail: roland@math.uh.edu

◇ **Dr. Eugene E. Tyrtyshnikov**
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